





NONTIDAL WETLANDS

Nontidal wetlands (wetlands not adjacent to tidal waters) are found all across the state. These wetlands include marshes, bogs, and swamps, and may include other areas which are only flooded or saturated for fairly short periods of time. Nontidal wetlands are delineated on the ground by the presence of wetland hydrology, wetland soils, and wetland vegetation. Many of these wetlands are forested.

These wetlands areas often provide important benefits such as water quality improvement, flood control, natural products for human use, and aesthetic and recreational opportunities. They also provide habitat for a wide variety of plants and animals, many of which depend on wetlands for all or part of their life cycle.

Activities in nontidal wetlands, such as excavation, filling, draining, or other activities which may change the water level will require a permit issued by the Maryland DNR - Water Resources Administration. Most forestry activities, such as the harvest of timber or the creation of roadways do not require a permit. However, these activities must be carried out under an Erosion and Sediment Control Plan approved by your county Soil Conservation District, and must follow guidelines called Best Management Practices.

These Best Management Practices or "BMP's", which describe how certain operations should be carried out, must be used to prevent or minimize any adverse impacts on water quality, or the functional characteristics of the wetland.

For more information, contact your forester or your local Soil Conservation District.

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VALUES OF RIPARIAN FORESTS

Forested areas along streams, rivers and other water bodies are classified as riparian forests. Riparian forests often differ from upland forests in their hydrology, plant community, soils, and topography. Where a riparian forest is adjacent to areas with other uses, such as a field, developed area, or area of forest to be harvested, it is often referred to as a "buffer". These areas have the same benefits of woodland anywhere, (wood production, wildlife, erosion control, recreation, aesthetic enjoyment, etc.), but also have some unique values.

Forested land provides an effective way to prevent erosion, minimize flooding, and protect the quality of the water in our streams, rivers and the Chesapeake Bay. Many of the water quality problems and frequent flooding we experience in some areas today can be attributed to the fact that the forestland has been converted to other uses As rain falls through the various layers of a forest canopy, its force is diminished and it is intercepted and absorbed by the porous layers of the forest floor. The vegetation, fallen leaves and twigs, humus, and roots all act to hold the soil in place and infiltrate water into the ground. This water is then slowly released through the water table to replenish springs and streams and recharge groundwater supplies. Large amounts of water are also absorbed by the trees and returned to the atmosphere through transpiration, thus continuing the cycle of water in the environment.

Studies have shown that riparian buffers as narrow as 50 feet in width can filter out, absorb, and utilize most of the sediment, nitrogen, and phosphorus carried in nunoff from adjacent fields. These are major contributors to the pollution of our streams, rivers and the Chesapeake Bay. Tree roots also help stabilize streambanks by holding soil in place and supply cover for fish and aquatic insects. Riparian forests also help slow down the velocity of flood waters and allow sediment to filter out.

Riparian forests support a great diversity of wildlife species because of the variety of habitat features found there. Some species are entirely dependent upon these riparian areas. Riparian buffers in agricultural or developed areas are important because they are often the only forest and "edge" available. These sometimes act as corridors which allow wildlife to move between isolated blocks of forested habitat. Also, these areas often contain a high density and diversity of migratory birds because they cannot feed or roost in the surrounding habitat.

In using your forestland, consider certain measures which will minimize any negative water quality impacts. Plan and build roads and trails carefully. During harvest operations, minimize the amount of exposed or compacted soil and leave forested buffers along streams and other waterways. Depending on the size of the harvest, a Sediment and Erosion Control Plan may be required to insure no adverse water quality impacts. The cutting of trees does not, in most cases, significantly affect water quality, provided that soil disturbance is minimized and forest vegetation is retained or allowed to regrow.

Your forester can provide more information on your forestland and water quality.

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WILDLIFE MANAGEMENT RECOMMENDATIONS

Prepared by Brenda Belensky, Erin Deneke, Jeff Feen Stewardship Biologists

INTRODUCTION

It is the goal of the Forest Stewardship Program to work with concerned landowners to enhance existing habitat for wildlife. Your interest in helping to provide quality habitat for wildlife species is encouraging. The land you own definitely has the potential to provide the necessary habitats needed by wildlife to survive year round.

Providing safe nesting cover and structures, and ample summer and winter food near existing winter cover is the basis of much of the following wildlife management recommendations:

SNAG MANAGEMENT

Cavity nesting birds such as woodpeckers, chickadees, titmice, great-crested flycatchers and bluebirds nest in tree cavities which they excavate themselves or which were excavated by other cavity nesting birds. Therefore, the limiting factor for these birds is the number of standing dead trees that are suitable for nesting. The ideal density of standing snags is an average of 10-20 small snags and 2-5 large (>12" diameter) snags per acre. Homeowners can help cavity nesting birds by only cutting down snags that are endangering their vehicles or homes. Where possible, all other snags should be allowed to stand until they fall down of their own accord. In addition to providing nesting habitat, snags provide feeding areas for many birds throughout all stages of decay.

Where the number of snags is below optimum, you can create snags by girdling trees in the manner prescribed by your forestry plan. Live trees with existing cavities should be left as they are more beneficial and the cavities last longer than cavities in dead trees. Also, healthy mast trees (i.e., oaks and hickories) should not be cut as they produce nuts that are beneficial to many species of forest wildlife.

FIELD EDGE MANAGEMENT

Introduction:

Studies have found that larger numbers and a greater variety of wildlife occur where forest and field meet than in either the forest or field. Biologists call this phenomenon the "edge effect" and believe it takes place because a greater diversity of food and cover exists near the edge between habitats. Edges also exist where fields border ditches, hedgerows, or field roads, and where fields containing different types of vegetation or crops meet. The following sections discuss methods to improve this effect at field borders, with recommendations for herbaceous, shrub, and cut-back borders, and important considerations in managing field edges.

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Herbaceous Borders:

Strips containing grasses and legumes or native annuals and perennials along permanent cover can serve as nesting areas for ground nesting birds. Seeds produced by the mixture, as well as insects and small rodents attracted to the mixture, will also provide food for many species of wildlife.

Herbaceous borders should be a minimum of 50 feet wide along the woods and 10 feet wide along ditches, field roads, and fence lines with permanent cover. Prepare a seed bed when frost leaves the ground in spring by plowing, discing, and dragging or harrowing. A soil test performed by the Maryland Cooperative Extension Service is necessary to determine the amount of lime and fertilizer to be used to establish the border. To establish the pasture mix, lime and fertilize according to the soil test results and follow standard agricultural practices to establish the following mix as you would a hay crop:

White Dutch or

Ladino Clover 4lbs/ac Orchard Grass 5lbs/ac

Plant the above mix from March 1 to May 15 or from August 1 to September 30. Grass-legume mixtures (Table 1) should be seeded using a drill or Brillion seeder. All legume seeds (clovers, alfalfa, and all the lespedeza) must be treated with the proper commercial inoculant prior to planting. If needed, further technical assistance is available from the Cooperative Extension Service in your county.

Maintain your pasture mix and control woody plants by mowing 1/4 to 1/3 of your pasture mix acreage each summer during the month of August. Mowing in August permits regrowth prior to winter so that these areas will be suitable for nesting the following spring. However, mowing prior to August is likely to destroy nests and may injure young rabbits.

Native annuals and perennials will invade if the strip remains fallow; these are beneficial to wildlife. Mow every two to four during the month of August to reduce density and to prevent encroachment of brush. Only 1/3 to 1/2 of a border or alternating 300-ft. segments should be moved in any one year. Areas 1/10 to 1/4 acre may be moved more frequently for rabbits.

State law requires that you control noxious weeds (Johnson grass, Canada thistle and shattercane) on your property. If you are having problems with these species, contact your county extension agent to explore the possible alternatives. I recommend that you use spot-spraying or spot-mowing where possible to control these weeds.

Shrub Borders:

Shrub borders provide wildlife food and cover, serve as fences, establish contour guidelines, provide screens, and help to delineate field boundaries. They also provide permanent cover adjacent to herbaceous borders.

Examples of species to be planted and their spacing are presented in Table 1. Depending on space allocated, shrub borders should be a minimum of one to five rows wide. Plow or disc the fall preceding planting or scalp the sod just prior to planting. Fertilize and lime according to a current soil test and plant as soon as frost leaves the ground in the spring. Plants should be placed in a hole wide and deep enough to accommodate the roots in a natural manner at the nursery planting depth or the root collar. Mulching each plant with straw, old hay, or plastic will improve survival percentage.

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Another technique is to plant clumps of shrubs and trees in open field corners, ditch intersections, or other odd areas. This will provide valuable food and cover while using a minimum of 600 square feet with at least 50 percent in the center planted to dense-growing evergreens.

All shrub borders should be worked two years after planting and every five years thereafter to remove undesirable trees and shrubs. The tops of evergreen trees should be clipped off to cause them to bush out.

Cut-back Borders (Woodland Edges):

Herbaceous and shrub borders can be created without a loss of valuable cropland by cutting back the woods edge. Herbaceous borders can be formed by clearing all trees flush with the ground. Natural shrub borders can be established by removing low value woody plants that are more than one inch in diameter at breast height, while leaving oaks, hickories, beech, wild cherries, dogwood, any den trees, or other trees valuable to wildlife. Shrubs of high wildlife value (Table 1) may be planted where needed to increase the value of cut-back borders of shrubs.

Minimum width of herbaceous borders should be 50 feet, and shrub borders should be 25 feet. Cut-back borders should be maintained in the same manner as described in the two previous sections. (Note: Cut-back borders cannot be used within the 100 foot buffer of the Chesapeake Bay Critical Area).

Important Considerations:

Two important considerations are to create a diverse and "soft" edge. Plants which fruit or seed during different seasons will provide food all year. It is necessary to plant several species which provide winter food if other sources are scarce. Evergreens, mixed with deciduous plants, will ensure that adequate cover is available during storms or harsh winter weather. An irregularly shaped border produces more edge than a straight border. Lastly, a diversity in sizes of plants is important because different wildlife species use various heights occurring at the edge and a single species may use different sizes for various biological functions such as feeding, nesting, and roosting. Figure 1 illustrates a "hard" and "soft" edge. A soft edge has vegetation that gradually increases in size whereas a hard edge has small plants adjacent to large. Soft edges are used to a greater extent by wildlife than are hard edges. Soft edges can be created either by planting or through the use of cut-back borders.

Turkey:

Turkeys may range up to 4,000 acres daily. When an appropriate interspersion of habitats is available, they may confine their daily activity to 400-1000 acres. Prime range is characterized by a diversity of forest types and age classes, predominated by mature hardwoods, well interspersed with small openings and some cultivated land. Thus, your property alone will not support turkeys. However, in conjunction with surrounding properties, all of the habitat requirements may be present.

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The following are recommendations for the forest on your property. A variety of mast producing trees should be maintained including oaks, beech, cherry and ash. Grape thickets, briar patches, spring seeps, and small streams should all be protected because of their value as sources of food during winter. Grazing by deer should be kept at a level so that food-producing plants are not destroyed and there is minimal competition for mast. This may require harvesting deer on your property if population levels are too high in the area. Lastly, turkeys are very susceptible to human disturbances and disturbances from free ranging dogs. Therefore, every effort should be made to limit these disturbances.

Rabbits:

The cottontail rabbit is found throughout the state and is easily managed. They require good cover near food and a place to bear young. Home ranges of rabbits generally consist of 5 to 10 acres for males and 3 to 4 acres for females. They spend most of their life within 150 feet of dense brushy cover. Food supply for cottontails is generally adequate since they eat a great variety of plant foods. Rabbits need unmowed grass for nesting cover, grasses and legumes for food, dense brush and vines for escape cover and winter food. Planting clover plots or incorporating clover into the existing grass would be of help. Leaving uncut or overgrown brushy areas provide both escape and winter cover. The same browse areas created for deer also benefit rabbits.

Since rabbits nest on the ground, the young are very vulnerable. Controlling stray cats will help greatly.

Squirrels:

Squirrels depend on a good mast crop for their survival, including the fruits of such species as oaks, hickories, beeches, and walnuts. Therefore, any management practice that would help the mast crop is desirable. Since no one species can be depended upon for an annual mast crop, a variety of mast producing trees should be encouraged.

Besides food, the limiting factor affecting squirrels is good den trees for nesting sites. Enclosed is a note describing construction and placement of squirrel nest boxes.

Brush Piles:

Brush piles can provide important escape cover for many small animals. Please refer to the enclosed reference material on how to build brush piles included with this plan. You could build several large brush piles along your woodland edge.

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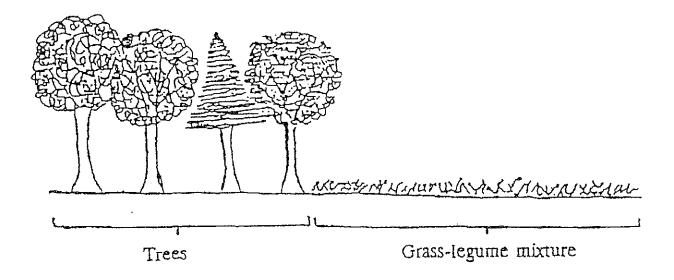
Table 1. Representative species to plant at field edges to benefit wildlife.

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|--------------------------|------------------------|--|
| } | orchard grass | 2 lbs/acre |
| | Blackwell switchgrass | 4 lbs/acre |
| | reed canarygrass | 6 lbs/acre |
| grass-legume | Korean lespedeza | 20 lbs/acre |
| 1 | common lespedeza | 20 lbs/acre |
| | ladino clover | 4 lbs/acre |
| | alsike clover | 4 lbs/acre |
| | blueberry | 4' x 1.5' |
| small shrubs | coralberry | 4' x 1.5' |
| Sman sinuos | huckleberry | 4' x 1.5' |
| | blackberry | 4' x 1.5' |
| | tartarian honeysuckle | 6' x 6' |
| • | red osier dogwood | 6' x 6' |
| 1 | graystem dogwood | 6' x 6' |
| | silky dogwood | 6' x 4' |
| tall shrubs | amur honeysuckle | 6' x 4' |
| | autumn olive | 6' x 4' |
| | hazelnut | 6' x 4' |
| | American cranberrybush | 6' x 4' |
| | bicolor lespedeza | 6' x 1.5' |
| | flowering dogwood | 8' x 8' |
| | American holly | 8' x 8' |
| | crab apple | 8' x 8' |
| small trees ² | serviceberry | 8' x 8' |
| | staghorn sumac | 8' x 8' |
| | scotch pine | 8' x 8' |
| | black pine | 8' x 8' |

¹Spacing is presented as space between rows x space between plants.

²Pines should be topped when they reach 4-6 ft. in height.

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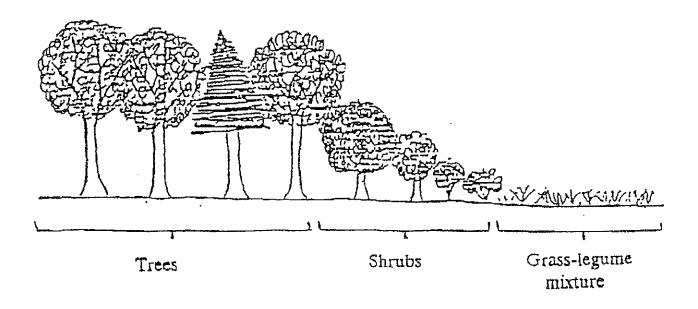


Fig. 1. An illustration of the vegetational structure of a hard (top) and soft edge. Wildlife use of soft edges is greater than that of hard edges.

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WHAT ARE FIDS?

Forest Interior Dweller species (FIDs) are an important component of Maryland forests. There are 19 species of birds found here in Maryland. These birds all have one thing in common in that they require large tracts of relatively undisturbed mature hardwood forests as breeding habitat. The loss of these forests and the fragmentation of the remainder due to agriculture and increasing urbanization is the leading threat to these birds. Competition from edge species which arrive earlier or are year round residents, parasitism by brown headed cowbirds, and predation by edge species like blue jays and racoons take a heavy toll on the population. Critical habitat for these birds is the interior forest canopy where competition from edge species is limited. A large tract of woods does not guarantee FID species although it can encourage or promote them with good forest stewardship practices which encourage structural diversity in the forest and maintain a crown closure of 70%. Regeneration harvests on areas of 100 acres or more are not detrimental as long as the harvest is kept to the edges of the forest and is done in small areas (<25 acres).

Conservation of FID habitat is required within the Chesapeake Bay Critical Area and recommended in other areas also. The following are management recommendations for FIDs that should be considered when forest management operations are planned.

- 1) Minimize forest disturbances during the breeding season (May 1 August 31) whenever possible.
- 2) The forest canopy should not be removed in excess of 70% crown closure with selective cutting or timber stand improvement practices.
- 3) Retain or encourage snags 10 inches diameter at breast height or greater. Cluster snags where possible. Snags which protrude above a closed forest canopy should be removed.
- 4) Maintain forested buffers along streams and shorelines. Daylighting (widening) of access roads in forest interiors should be discouraged.

If you have any questions concerning FID species or habitat or think they might be present on your property please call your local forester of biologist.

Forest Interior Breeding Birds of Coastal Maryland

| Red Shouldered Hawk* |
|----------------------|
| American Redstart* |
| Barred Owl* |
| Prothonotary Warbler |
| Whip-poor-will |
| Worm-eating Warbler* |
| Hairy Woodpecker |
| |

| Pileated Woodpecker |
|-----------------------|
| Ovenbird |
| Acadian Flycatcher |
| Louisiana Waterthrush |
| Yellow-throated Vireo |
| Kentucky Warbler* |
| Red-eyed Vireo |
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Northern Parula Scarlet Tanager Black-and-White Warbler Swainson's Warbler* Hooded Warbler *species especially sensitive to disturbance

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FOREST MANAGEMENT NOTES

PROTECTING THE FOREST FROM WILDFIRE

Maryland's forest lands are under the constant threat of damage caused by wildfire. The main causes of wildfire in Maryland involve human activities such as: debris burning, arson, equipment use, and children playing with fire.

Wildfire damages woodlands not only by killing trees outright, but also by destroying seeds and seedlings. Entire forest reproductive cycles can be wiped out by one brisk wildfire. Fire damages larger trees by leaving wounds which heal slowly and provide a point of entry for insects and diseases. Wildfire damages not only trees but affects the soil and water quality. Burning off the litter layer exposes the soil to the effects of wind and rain, the resulting soil erosion may choke creeks and streams. Fire endangers homes and utilities in wooded settings, causing thousands of dollars in damage. A well maintained road system in your woodland aides in stopping fires by creating a fuel break and by providing a means of quick access for firefighters.

The Maryland Forest Service enforces open air burning regulations. The following regulations apply to those activities occurring within 200 feet of a woodland, or those activities adjacent to flammable materials that could ignite and carry fire to a woodland.

***** OPEN AIR BURNING REGULATIONS *****

A person may not engage in open air burning except under the following conditions:

- 1. There is a natural or constructed fire break at least 10 feet wide completely around the material to be burned that is free of flammable material.
- 2. Adequate personnel and equipment are present to prevent the fire from escaping.
- 3. At least one responsible person remains at the location of the fire until the last spark is out.
- 4. Burning occurs during the hours of 4:00 pm and 12:00 midnight E.S.T., except when the ground is covered with snow allowing burning to occur at any time as long as other requirements are met.

NOTE!: OPEN AIR BURNING IN PRINCE GEORGE'S COUNTY IS ILLEGAL AT ANYTIME WITHOUT A PERMIT. Local Environmental Health Department regulations should be checked prior to burning.

If you have further questions concerning the protection of forest land from wildfire, contact your local Forestry office at 410-535-1303.

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FOREST MANAGEMENT NOTES

SQUIRREL NEST BOXES

Squirrel populations may be increased in young saw timber stands where natural nest cavities are scarce by putting up nest boxes. At least two den trees per acre are needed for good squirrel populations. In areas of young timber or where there are otherwise less than two den trees per acre, 2-3 nest boxes per acre should increase squirrel populations.

Squirrel Nest Box Specifications

Design specifications for a squirrel box are attached. A 3 inch square entrance hole is just large enough to permit squirrel use but excludes larger predators. A box depth of 1/4 inches or greater below entrance hole ensures that young squirrels are beyond the reach of raccoons and opossums.

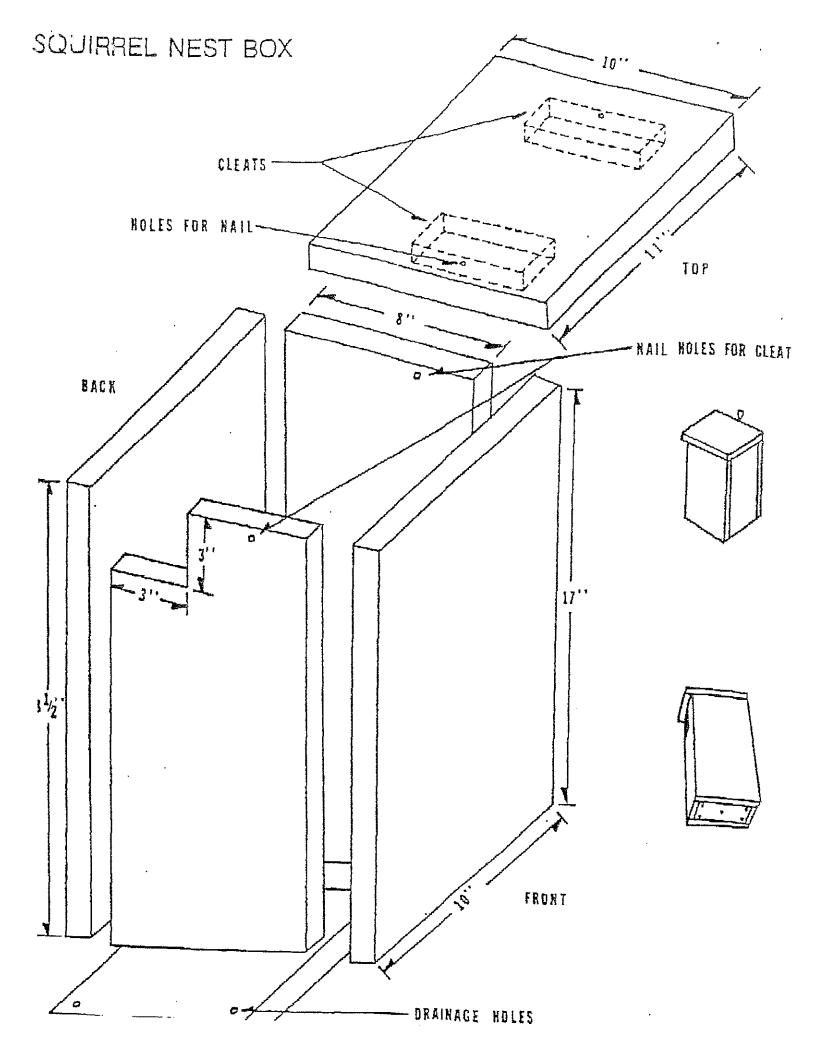
A sloping roof with an overhanging side reduces that amount of water seeping into the box. By using cleats, roof warping is minimized. The roof should be removable to allow for cleaning. Drill drainage holes into the bottom of the box to allow water, which gets into the box, to drain out. One-inch treated pine boards or untreated rough-cut heart cypress or cedar boards can be expected to last 20-25 years. If treated boards are unavailable, use heart cypress or cedar. Do not paint boxes.

Hang nest boxes on a tree trunk, 10 or more feet above the ground; the higher the better. It is advisable that boxes be hung above, but not directly on, one or more large limbs to shield the box from vandalism. Placing a box directly on a limb increases breakage due to tree sway and may increase predation by tree-climbing snakes, such as the black rat snake.

Suspend boxes from the tree with a 20d - to -40d zinc-coated or aluminum nail through a wire loop on the back of the nest box. In the interest of timber values, select trees of low merchantability or cull value for boxes. Boxes should not be placed in trees already containing cavities; squirrels will not readily accept boxes if natural cavities are available in the same tree. To prevent rocking or excess movement, tie a single strand of No. 10 solid polyethylene-coated wire around the box and tree. This arrangement of nails and wire is adequate to secure a box, yet flexible enough to slip (1) with tree growth, or (2) if knocked by falling limbs. Tightly fastened boxes are more apt to be demolished by falling objects.

Maintenance

If boxes are constructed of treated boards or cypress and assembled using rustproof nails, an effective life expectancy of 20-25 years is probable. Painting is not encouraged. Maintenance of properly constructed boxes is reduced to periodic rehanging to permit tree growth and renailing if nails have worked loose every 2-3 years. Visually check boxes for damage annually in October and, if necessary, repair the box and promptly rehang for reuse. Leaf litter should be left in boxes, or cleaned out of not more than 25% of the boxes in any given year.



FOREST MANAGEMENT NOTES

BRUSH PILES

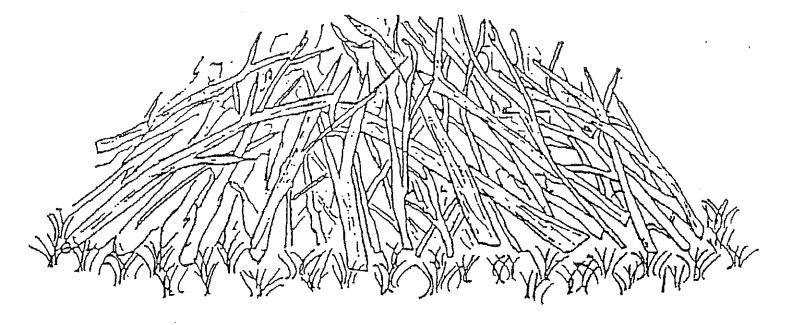
One of the most critical habitat requirements for many species of wildlife is cover. Many animals need dense cover throughout the year for various reasons such as concealment and protection from predators, protection from weather, and for resting or loafing cover. In areas where dense tangles of brush and vines are not common, the creation of artificial brush piles can provide much needed cover for ground nesting birds, rabbits, songbirds and other small animals.

Brush piles can be constructed along forest edges, in openings, in field corners, or along the margins of streams and marshes. Brush piles should be situated near grassy areas or cultivated lands so that food and nesting areas are close by. In open areas where cover is lacking, up to three to four brushpiles per acre should be constructed. Along woodland borders, one brush pile every 200 to 300 feet will provide adequate cover.

Brush piles should be built in conjunction with forest thinning or harvesting operations. The materials used for the brush pile will depend upon what is available on site. Rot resistant trees such as oaks and locust make durable bases for the brushpiles. The base of the brush pile should be formed by placing alternate layers of logs at right angles to one another. The logs used should be at least six inches in diameter and spaced six to ten inches apart in each layer. To increase the durability of the brush pile, the base layers may be stacked on top of stones, cinder blocks, or around large stumps.

A properly constructed base will keep pathways open under the pile once the brush is placed on top. Smaller trees and brush should be piled on top of the base until a mound or tepee shaped brush pile is created. Any type of brush may be used as filling on the piles, but evergreens will provide excellent cover for a number of years. Finished piles should be four to eight feet tall and ten to twenty feet across. If you choose to build a rectangular shaped brush pile, it should be at least ten feet wide and twenty-five feet long.

Remember to build the brush piles dense enough in the center to provide adequate shelter from adverse weather and predators, but loose enough around the edges to allow for easy access. Strict attention should be given to the size of the brush piles built. Most people make brush piles too small. If a person can kick a brush pile over, or a dog can burrow through them, they are too small.



FINISHED BRUSH PILES = WILDLIFE HABITAT

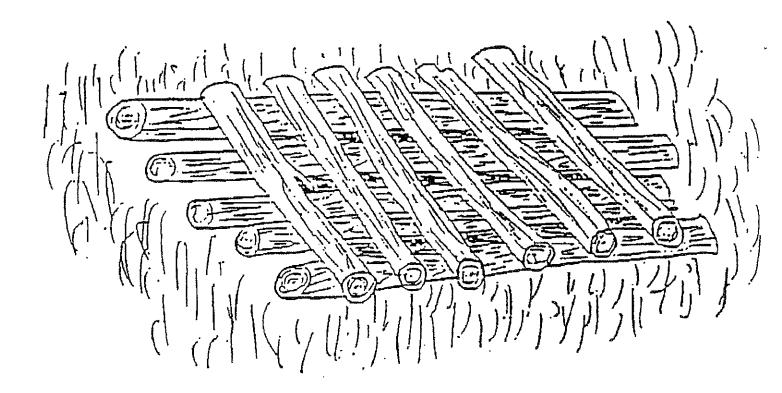


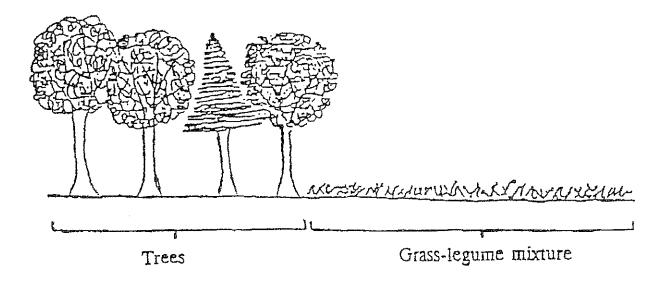
Illustration of Acceptable brush pile base

Table 1. Representative species to plant at field edges to benefit wildlife.

| Layer | Species | Seedling rates |
|--------------------------|---------------------------|----------------|
| | | or spacing l |
| | | 0.11. / |
| | orchard grass | 2 lbs/acre |
| | Blackwell switchgrass | 4 lbs/acre |
| grass-legume | reed canarygrass | 6 lbs/acre |
| | Korean lespedeza | 20 lbs/acre |
| | common lespedeza | 20 lbs/acre |
| | ladino clover | 4 lbs/acre |
| | alsike clover | 4 lbs/acre |
| | hluaharra | 4' x 1.5' |
| small shrubs | blueberry coralberry | 4' x 1.5' |
| oman omano | • | 4' x 1.5' |
| | huckleberту blackberry | 4' x 1.5' |
| | olackoch y | 4 X 1.3 |
| | tartarian honeysuckle | 6' x 6' |
| | red osier dogwood | 6' x 6' |
| tall shrubs | graystem dogwood | 6' x 6' |
| | silky dogwood | 6' x 4' |
| | amur honeysuckle | 6' x 4' |
| | autumn olive | 6° x 4° |
| | hazelnut | 6' x 4' |
| | American cranberrybush | 6' x 4' |
| | bicolor lespedeza | 6' x 1.5' |
| | flowering dogwood | 8' x 8' |
| | American holly | 8' x 8' |
| small trees ² | crab apple | 8' x 8' |
| - | serviceberry | 8' x 8' |
| | staghorn sumac | 8' x 8' |
| | scotch pine | 8' x 8' |
| | black pine | 8' x 8' |

¹Spacing is presented as space between rows x space between plants.

²Pines should be topped when they reach 4-6 ft. in height.



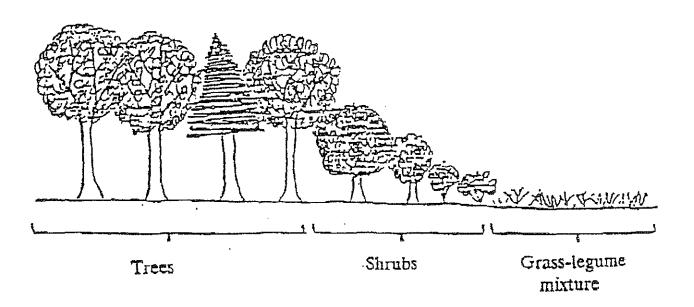


Fig. 1. An illustration of the vegetational structure of a hard (top) and soft edge. Wildlife use of soft edges is greater than that of hard edges.





Maryland DNR Forest Service 580 Taylor Ave., E-1 Annapolis, MD 21401 Publication # - 02-7192012-587 August 1, 2012



Invasive Plants and Insects of Maryland

Invasive plants and insects can be problematic for forest landowners. From vines that take over disturbed areas, forest edges, and tree canopies to insects that defoliate and girdle trees, these pests not only decimate the natural ecosystem, they are difficult to control and can be expensive to eradicate. This informational sheet discusses the identification and guidelines for dealing with the insect commonly known as emerald ash borer.





David Cappaert, Michigan State University, Bugwood.org

DESCRIPTION Emerald ash borer is a small green insect from the Beetle (*Coleoptera: Buprestidae*) family. Adults have large black eyes, a reddish-purple abdomen, and metallic emerald green wing covers. The adult beetle is considered bullet shaped and its length is only as long as half a penny. It has a one year life cycle that starts when adults lay eggs in the bark of the trees in the spring and early summer. The eggs hatch and the larvae tunnel into the trees in the fall and begin feeding on the tree. The following spring the larvae emerge from the tree as adults. Infested trees are essentially girdled and killed over time from the damage sustained from larval feeding.

ORIGIN & SPREAD In 2002, emerald ash borer was found feeding on ash trees (*Fraxinus* spp.) in Michigan. The exotic beetle likely arrived from Asia in shipping material. Since its arrival, emerald ash borer, or EAB, has impacted ash trees in Maryland and many other states. In the U.S., EAB has only been found to infest ash trees.



David Cappaert, Michigan State University, Bugwood.org

Spread of the pest has been increased by people transporting ash wood products such as firewood and logs that contained the insect and they didn't know it. As a result, many states have quarantine orders. Quarantines do not allow ash wood products to leave the quarantine area and have seemed to slow the spread of the pest.

SIGNS & SYMPTOMS

Looking for signs and symptoms of EAB is easier than finding the small beetle itself. For forest landowners, it is important to know if and how many ash trees are on the property. If present, the overall health of the trees should be evaluated. Stressed trees will have canopy dieback (usually upper branches losing leaves) and epicormic branching (small branches sprouting directly from the trunk). Splits in the bark of the tree can possibly be covering up galleries where the larvae have been. Increased woodpecker activity and damage can also be a sign of an infestation, as woodpeckers prefer to feed on EAB larvae.



David Cappaert, Michigan State University, Bugwood.org

Emerald ash borer leaves behind two definitive signs when it has infested a tree. The first is D-shape exit holes. When larvae emerge as adults from the tree they leave a distinctive hole that looks like a sideways D. The second sign is how the larvae feed. After the larvae have tunneled into the tree, they start feeding on the tree in back and forth patterns referred to as serpentine or S-shaped galleries. These galleries can only be seen if you pull back the bark of the tree.

CONTROL OPTIONS

Several insecticides are available to control EAB for trees that are still healthy (less than 1/3 of crown affected), from soil injections or drenches to basal bark sprays or trunk injections (Herms et al. 2009). A soil drench product is available for general application by landowners, but the most effective products require a licensed professional. All must be applied strictly according to the pesticide label. Treatments are usually applied to urban trees because of cost and the need to repeat treatments every year or two. Silvicultural treatments can be used to reduce the ash component of a forest stand before trees are lost to EAB, and trees can be salvage harvested.

If emerald ash borer is found on your property, please contact the Maryland Department of Agriculture at 410-841-5920.

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Invasive Plants and Insects of Maryland

Invasive plants and insects can be problematic for forest landowners. From vines that take over disturbed areas, forest edges, and tree canopies to insects that defoliate and girdle trees, these pests not only decimate the natural ecosystem, they are difficult to control and can be expensive to eradicate. This informational sheet discusses the vine commonly known as English ivy.

English Ivy (Hedera helix (L.))



Forest & Kim Starr, Starr Environmental, Bugwood.org

DESCRIPTION

English ivy is an evergreen vine from the Ginseng (Araliaceae) family. It is a climbing vine capable of reaching heights of 90 feet, given the structure it is climbing on. Leaves are alternating, waxy or leathery, and green with white veins. Juvenile leaves are dark

lower 12-20 inches of the stem. Always read the herbicide label to ensure that the correct oil and penetrant are used. Some herbicide products, such as Pathfinder[®] II, are already mixed and are ready to be applied.

SUMMARY

When dealing with English ivy, it is important to remember that these applications will not completely control the infestation on the first attempt. Several attempts may be needed over several years. When viable, seeds may germinate in the soil for a couple of years and pieces of vines or roots may take hold and begin to grow vines again.

Table 1. Herbicide Suggestions for Controlling English Ivy Infestations.

| Application Method | Active Ingredient | Brand Name | Percent Solution | Time of Year |
|------------------------------|----------------------|----------------|-------------------------------|-----------------|
| Foliar Spray | Triclopyr | Garlon® 3A | 3-5% in water and surfactant | July to October |
| Foliar Spray | Triclopyr | Garlon® 4 | 3-5% in water, and surfactant | July to October |
| Foliar Spray | Glyphosate | Accord® XRT | 3-5% in water, and surfactant | July to October |
| Cut Stem (large vines) | Triclopyr | Garlon® 3A | 3-5% in water and surfactant | July to October |
| Cut Stem (large vines) | Triclopyr | Garlon® 4 | 3-5% in water and surfactant | July to October |
| Cut Stem (large vines) | Glyphosate | Accord® XRT | 5% in water and surfactant | July to October |
| Basal Spray (large vines) | Triclopyr | Garlon® 4 | 20% in a basal oil product | July to October |
| Basal Spray (large vines) | Triclopyr | Pathfinder II® | Undiluted | July to October |

Use pesticides wisely. The information in this sheet is intended to illustrate methods that are currently being practiced and does not endorse or promote any of the herbicide products listed. Please be sure to read herbicide labels, even if you have experience with the herbicide, as labels are updated frequently. All information in this sheet is based on the information of the herbicide labels at the time of printing. Please contact the Maryland Department of Agriculture (MDA) if you have any questions about pesticides. The MDA website (www.mda.md.state.us/plants-pests) contains a searchable pesticide database where you can search for pesticides, applicators, dealers, and businesses.

REFERENCES

Miller, James H.; Manning, Steven T.; Enloe, Stephen F. 2010. A management guide for invasive plants in southern forests. Gen. Tech. Rep. SRS–131. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 120 p.

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Invasive Plants and Insects of Maryland

Invasive plants and insects can be problematic for forest landowners. From vines that take over disturbed areas, forest edges, and tree canopies to insects that defoliate and girdle trees, these pests not only decimate the natural ecosystem, they are difficult to control and can be expensive to eradicate. This informational sheet discusses the grass commonly known as golden bamboo.

Golden Bamboo (Phyllostachys aurea (Carr. ex A. & C. Rivière))



Chuck Bargeron, University of Georgia, Bugwood.org

SUMMARY

When dealing with golden bamboo, it is important to remember that these applications may not completely control the infestation on the first attempt. Several attempts may be needed over several years. If rhizomes remain, sprouts may take hold and begin to grow again.

Table 1. Herbicide Suggestions for Controlling Golden Bamboo Infestations.

| Application Method | Active Ingredient | Brand Name | Percent Solution | Time of Year |
|--|----------------------|--------------------------|------------------------------|-------------------------|
| Foliar Spray | Imazapyr | Arsenal® AC | 1% in water and surfactant | September to October |
| Foliar Spray (Use in combination with Imazapyr) | Glyphosate | Roundup® Pro | 10% in water, and surfactant | September to October |
| Foliar Spray | Glyphosate | Accord® XRT | 2% in water, and surfactant | July to October |
| Cut Stem | Imazapyr | Arsenal® AC | 1% in water and surfactant | September to October |
| Cut Stem (Use in combination with Imazapyr) | Glyphosate | Roundup [®] Pro | 10% in water and surfactant | September to October |
| Cut Stem | Glyphosate | Accord® XRT | 25% in water and surfactant | April-October |
| Soil Surface | Hexazinone | Velpar® L | 2 gal per acre | See Label |

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Maryland DNR Forest Service 580 Taylor Ave., E-1 Annapolis, MD 21401 Publication # - 02-7192012-586 August 1, 2012



Invasive Plants and Insects of Maryland

Invasive plants and insects can be problematic for forest landowners. From vines that take over disturbed areas, forest edges, and tree canopies to insects that defoliate and girdle trees, these pests not only decimate the natural ecosystem, they are difficult to control and can be expensive to eradicate. This informational sheet discusses the shrub commonly known as multiflora rose.

Multiflora Rose (Rosa multiflora (Thunb.))



James H. Miller, USDA Forest Service, Bugwood.org

DESCRIPTION

Multiflora rose is a thorny shrub from the Rose (*Rosaceae*) family. It has long, stout, arching stems that climb over native vegetation. The leaves are pinnately compound and finely serrated with 5-9 leaflets. In the early summer, white or pinkish white flowers occur. Multiflora rose is a prolific seeder. One average-sized shrub is capable of

Table 1. Herbicide Suggestions for Controlling Multiflora Rose Infestations.

| Application Method | Active Ingredient | Brand Name | Percent Solution | Time of Year |
|--------------------------------|----------------------|----------------------------|-------------------------------------|---|
| Foliar Spray | Metsulfuron | Escort® XP | 1 oz per acre | April to June |
| Foliar Spray | Triclopyr | Garlon® 4 | 2% in water, and surfactant | July to October |
| Foliar Spray | Glyphosate | Accord® XRT | 4% in water, and surfactant | July to October |
| Foliar Spray | Imazapyr | Arsenal® AC | 1% in water and surfactant | August to October |
| Cut Stem (larger stems) | Triclopyr | Garlon® 4 | 25% in water and surfactant | April to October |
| Cut Stem | Triclopyr | Brush-B-Gone® | Undiluted | Year-Round |
| Cut Stem | Triclopyr | Brush Killer® | Undiluted | Year-Round |
| Cut Stem | Triclopyr | Vine X® | Undiluted | Year-Round |
| Cut Stem (larger stems) | Imazapyr | Arsenal® AC | 10% in water and surfactant | April to October |
| Cut Stem (larger stems) | Glyphosate | Accord® XRT | 20% in water and surfactant | April to October |
| Basal Spray (smaller stems) | Triclopyr | Garlon® 4 | 20-25% in a basal oil product | January to February; May to October |
| Basal Spray (smaller stems) | Triclopyr | Pathfinder [®] II | Undiluted | January to February; May to October |

Use pesticides wisely. The information in this sheet is intended to illustrate methods that are currently being practiced and does not endorse or promote any of the herbicide products listed. Please be sure to read herbicide labels, even if you have experience with the herbicide, as labels are updated frequently. All information in this sheet is based on the information of the herbicide labels at the time of printing. Please contact the Maryland Department of Agriculture (MDA) if you have any questions about pesticides. The MDA website (www.mda.md.state.us/plants-pests) contains a searchable pesticide database where you can search for pesticides, applicators, dealers, and businesses.

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